

# CURRICULUM VITÆ

## ANTHONY B. DAVIS

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## EDUCATION

McGill University, PhD, Physics, 1992

Université de Montréal, MSc, Physique, 1980

Université Pierre et Marie Curie (Paris 6), Maîtrise en Physique, 1977

## EXPERIENCE

### Research (Atmospheric Physics, Radiation, and Remote Sensing):

- 02/09 – present *Research Scientist*, Aerosols and Clouds Group (3285),  
**Jet Propulsion Laboratory**, managed for NASA by California Institute of Technology.
- 06/10 – present *Visiting Research Faculty*, Joint Institute for Regional Earth System Science and Engineering (JIFRESSE), University of California – Los Angeles
- 02/09 – present *Guest Scientist*, Space and Remote Sensing (ISR-2) & Space Data (ISR-3) Groups,  
11/97 – 01/09 *Technical Staff Member*, Space and Remote Sensing Group (ISR-2),  
**Los Alamos National Laboratory**, managed for the US DOE by:  
University of California (1943-2006); Los Alamos National Security, LLC (06/2006 – present).
- 11/92 – 10/97 **NASA – Goddard Space Flight Center**  
95-97, Climate and Radiation Branch: *Senior Scientist*, SSAI  
92-94, Climate and Radiation Branch: *GSFC Visiting Scientist*, USRA
- 05/92 – 10/92 **Atmospheric Environment Service**  
*Postdoctoral Research Fellow*, NSERC, Numerical Prediction Research Division
- 01/86 – 08/86 **Université de Sherbrooke**  
*Research Assistant*, Centre d'Applications et de Recherches en Télédétection (CARTEL)

### Teaching (Physics, Astronomy, and Astrophysics) and Freelance Activity:

- 09/84 – 04/86 **Concordia University**, Montreal (Qc, Canada), Physics Department, *Part-Time Professor*
- 01/82 – 12/83 **Collège de Sherbrooke**, Sherbrooke (Qc, Canada), Département de Physique, *Full-Time Prof.*
- 01/81 – 04/81 **Université de Sherbrooke**, Sherbrooke (Qc, Canada), Département de Physique, *Part-Time Prof.*
- 05/80 – 04/81 **Les Productions Régulus**, Longueuil (Qc, Canada), *Technical Writer*
- 07/78 – 10/85 **Dow Planetarium**, Montreal (Qc, Canada), *Lecturer, Script Writer*

## MEMBERSHIP

American Geophysical Union (since 1991)

Optical Society of America (since 1997)

American Meteorological Society (since 1998)

## AWARDS & HONORS

**NASA**, Group Achievement Award (February 2015): Studies of Emissions and Atmospheric Composition, Clouds and Climate Coupling by Regional Surveys (SEAC4RS) campaign in 2013

**Journal of Quantitative Spectroscopy and Radiative Transfer**, Outstanding Reviewer (February 2014)

**Kavli Institute for Theoretical Physics (KITP), University of California – Santa Barbara (UCSB):**

Visiting Scholar, 4/18–5/6/2011, Research Program on “The Nature of Turbulence” (Feb-June, 2011)

**Los Alamos National Laboratory (LANL), New Mexico:**

Nomination to represent LANL at 2006 R&D100 Awards: Wide-Angle Imaging Lidar (WAIL)  
Distinguished Performance Award (2005) – Small Team, Wide-Angle Imaging Lidar (WAIL)  
Distinguished Performance Award (2001) – Large Team, Multispectral Thermal Imager (MTI)  
Performance Award (1999) – Space and Remote Sensing Science Group

**Université Blaise Pascal (Clermont-Ferrand, France):**

Visiteur Scientifique Invité, Laboratoire de Météorologie Physique (LaMP) du CNRS (2002)

**University of New South Wales (Sydney, Australia):**

Gordon Godfrey Visiting Scholar, School of Physics (2001)

**Optical Society of America:**

Blue-Ribbon Prize Poster, Category Optics in Biology and Medicine (1998 Annual Meeting)

**NASA – Goddard Space Flight Center:**

Performance Award – Climate and Radiation Branch (1996)

**Météorologie Nationale (France):**

Collaborateur Scientifique, Centre de Recherche en Météorologie Dynamique (1991)

**Scholarships:**

Atmospheric Environment Service – Environment Canada (1989 – 1990)

Fonds FCAR – Gouvernement du Québec (1986 – 1989)

## SERVICE

**Reviewer (articles):** Applied Optics, Atmospheric Measurement and Technology – Discussion (AMT-D), Atmospheric Science Letters, Environmental Fluid Dynamics, Geophysical Review Letters, IEEE Transactions in Geoscience and Remote Sensing (TGRS), Journal of Applied Meteorology & Climatology, Journal of Atmospheric and Oceanic Technology, Journal of Climate, Journal of Computational Physics, Journal of Geophysical Research – D (Atmospheres), Journal of the Atmospheric Sciences, Journal of the Optical Society of America – A (Optics, Image Science, and Vision), Journal of Physics – A (Mathematical and Theoretical), Journal of Quantitative Spectroscopy and Radiative Transfer, Remote Sensing of the Environment, Optical Science and Engineering, Physical Review E (Statistical, Nonlinear, and Soft Matter Physics), Physical Review Letters, Quarterly Journal of the Royal Meteorological Society, Water Resources Research, and a few others.

**Reviewer (proposals):** NASA – Earth Science Division (Radiation Sciences & Graduate Fellowship Programs); DOE – Office of Science (ARM Program); NSF – Geosciences; LANL – Laboratory Directed Research and Development (LDRD) programs; FOM (The Netherlands); JPL internal reviews.

**Editor:** with Alexander Marshak (NASA – GSFC) of *3D Radiative Transfer in Cloudy Atmospheres* (Series in Physics of the Earth and Space Environments), xii+686 pp, Springer, Heidelberg (Germany), 2005; with Richard Sanchez (CEA – Saclay) for *Journal of Quantitative Spectroscopy and Radiative Transfer* (Special Issue on the M&C2009 ANS Topical Meeting), Vol. 112, 2011.

**Committee or working-/focus-group member:** AGU Focus Group on Nonlinear Geophysics (founding member); AMS Committee on Atmospheric Lidar Studies (CLAS); Executive Committee, Intercomparison of 3D Radiation Codes (I3RC); DOE Atmospheric Radiation Measurement (ARM) Program: Radiative Processes (RP) and Cloud Properties (CP) Working Groups; International Space Science Institute (ISSI) workshop series on Aerosol Remote Sensing from Space.

**Convener:** Several special-topic sessions at AGU Fall and Spring/Joint Meetings in Union (U), Atmospheric Science (AS) sections, and Nonlinear Geophysics (NG) focus group, at DOE/ARM Science Team Meetings, at I3RC International Workshops, and at the American Nuclear Society's Mathematics & Computation 2009 Conference; Technical Committee Member and Mini-Symposium Co-Chair for the International Conference on *Image Science 2012* sponsored by the Society for Industrial and Applied Mathematics (SIAM).

**Mentor/co-mentor (undergraduate students):** Olivia M. Castellini (DePauw University), Jesse Venegas (California State University), Brahim Piqué (U. of Puerto Rico), and Lernik Asserian (UCLA).

**Mentor/co-mentor (graduate students):** Charles A. Rohde (Michigan Technological University), Nikola P. Petrov (U. of Texas), Heather M. Ward (U. of NM), Emad Iskander (San Jose State University), Guillaume Merlin (U. de Lille 1), and Aviad Levis (Technion–IIT).

**Mentor/co-mentor (postdocs):** Stéphane Roux (NRC-NASA Fellow), Karen L. Hirsch (LANL programmatic), Christopher A. Jeffery (LANL PRD Fellow), Karen E. Fisher (LANL programmatic), Igor N. Polonsky (LANL PRD Fellow), Feng Xu (NPP Fellow), and Suniti Sanghavi (JPL/Caltech).

**Doctoral jury member:** U. de Bordeaux, U. de Clermont-Ferrand, U. of New South Wales, Boston U., U. de Lille, and U. Paris-Est/ENPC.

**Professional reference:** Rutgers U., U. of Washington, Heidelberg U., U. de Clermont-Ferrand, CNRS-LOA/U. de Lille 1, UMBC/JCET, UCSB/ICISS, NASA/GSFC, PNL, BNL, LANL, SNL, and others.

## PUBLICATIONS & PRESENTATIONS (SUMMARY)

- 72 referred publications in archival journals (cf. appended list)
- 52 articles and chapters in edited volumes, mostly peer-reviewed (cf. appended list)
- 82 extended abstracts contributed to conference proceedings, some peer-reviewed (cf. appended list)
- 12 preprints and technical reports (cf. appended list)
- 16 outreach and tutorial documents for *Laser Focus World*, *Physics Today*, *Eos – AGU Transactions*, *Web postings*, *Etc.* (cf. appended list)
- Co-editor and co-author of *3D Radiative Transfer in Cloudy Atmospheres*, xii+686 pp, Springer, Heidelberg (Germany), 2005.
- 400+ presentations at conferences, symposia, workshops, and other meetings (list available upon request)

## PEER-REVIEWED ARTICLES (SELECTION)

- A.A. Kokhanovsky, **A.B. Davis**, B. Cairns, O. Dubovik, O. Hasekamp, I. Sano, S. Mukai, V.V. Rozanov, P. Litvinov, T. Lapyonok, I.S. Kolomiets, Y.A. Oberemok, S. Savenkov, W. Martin, A. Wasilewski, A. Di Noia, F.A. Stap, J. Rietjens, F. Xu, V. Natraj, M. Duan, T. Cheng, and R. Munro, “Space-Based Remote Sensing of Aerosols: The Multi-Angle Spectro-Polarimetric Frontier,” *Earth-Science Reviews* 145, 85-116 (2015).
- A.B. Davis** and F. Xu, “A Generalized Linear Transport Model for Spatially-Correlated Stochastic Media,” *Journal of Computational and Theoretical Transport* 43 (1–7), 474-514 (2014).
- I. Langmore, **A.B. Davis**, and G. Bal, “Multi-Pixel Retrieval of Structural and Optical Parameters in a 2D Scene with a Path-Recycling Monte Carlo Forward Model and a New Bayesian Inference Engine,” *IEEE Trans. Geosc. and Remote Sens.* 51 (5), 2903-2919 (2013).
- F. Xu, R.A. West, and **A.B. Davis**, “A Hybrid Method for Polarized Radiative Transfer Computation in a Spherical-shell Planetary Atmosphere,” *J. Quant. Spectrosc. Rad. Transf.* 117, 59-70 (2013).
- G. Bal, **A.B. Davis**, and I. Langmore, “A Hybrid (Monte-Carlo/Deterministic) Approach for Multi-Dimensional Radiation Transport,” *J. Comput. Phys.* 230, 7723-7735 (2011).
- A.B. Davis** and A. Marshak, “Radiation Transport in the Cloudy Atmosphere: A 3D Perspective on Observations and Climate Impacts,” *Rep. Prog. Phys.* 73, 026801 (70pp), doi:10.1088/0034-4885/73/2/026801 (2010).
- A.B. Davis**, I.N. Polonsky, and A. Marshak, “Space-Time Green Functions for Diffusive Radiation Transport, in Application to Active and Passive Cloud Probing,” in *Light Scattering Reviews, Vol. 4: Single Light Scattering and Radiative Transfer*, A.A. Kokhanovsky (Ed.), Springer, Heidelberg (Germany), 169-292 (2009).
- D. Sornette, **A.B. Davis**, K. Ide, K.R. Vixie, V. Pisarenko, and J.R. Kamm, “Algorithm for Validation, Theory and Application,” *Proc. Nat. Acad. Sci.* 104, 6562-6567, doi: 10.1073/pnas.0611677104 (2007).
- A.B. Davis**, “Multiple-Scattering Lidar From Both Sides of the Clouds: Addressing Internal Structure,” *J. Geophys. Res.* 113, D14S10-14S25, doi:10.1029/2007JD009666 (2007).
- A.B. Davis** and A. Marshak, “Photon Propagation in Heterogeneous Optical Media with Spatial Correlations: Enhanced Mean-Free-Paths and Wider-Than-Exponential Free-Path Distributions,” *J. Quant. Spectrosc. Rad. Transf.* 84, 3-34 (2004).
- A.B. Davis** and A. Marshak, “Space-Time Characteristics of Light Transmitted Through Dense Clouds, A Green Function Analysis,” *J. Atmos. Sci.* 59, 2714-2728 (2002).
- A.B. Davis**, “Cloud Remote Sensing with Sideways-Looks: Theory and First Results Using Multispectral Thermal Imager Data,” *S.P.I.E. Proc.* 4725, 397-405 (2002).
- A.B. Davis** and A. Marshak, “Multiple Scattering in Clouds: Insights From Three-Dimensional Diffusion/P<sub>1</sub> Theory,” *Nucl. Sci. Eng.* 137, 251-288 (2001).
- A.B. Davis**, R.F. Cahalan, J.D. Spinhirne, M.J. McGill, and S.P. Love, “Off-Beam Lidar: An Emerging Technique in Cloud Remote Sensing Based on Radiative Green-Function Theory in the Diffusion Domain,” *Phys. Chem. Earth (B)*, vol. 24, 177-185, Erratum 757-765 (1999).
- A. Davis**, A. Marshak, R.F. Cahalan, and W.J. Wiscombe, “The LANDSAT Scale-Break in Stratocumulus as a Three-Dimensional Radiative Transfer Effect, Implications for Cloud Remote Sensing,” *J. Atmos. Sci.* 54, 241-260 (1997).
- A. Davis**, A. Marshak, W.J. Wiscombe, and R.F. Cahalan, “Multifractal Characterizations of Non-stationarity and Intermittency in Geophysical Fields, Observed, Retrieved or Simulated,” *J. Geophys. Res.* D99, 8055-8072 (1994).

## Funding History – Anthony B. Davis

—— Past ——

- FY94–FY96 (≈\$220K/y): DOE Office of Science’s Atmospheric Radiation Measurement Program  
*Scale-By-Scale Statistical Analyses of ARM And Other Cloud Data in Support of 3D RT Studies*,  
AD as co-I (PI: Warren J. Wiscombe, NASA-GSFC)
- FY96–FY98 (≈\$100K/y): NASA-GSFC Director’s Discretionary Funding (DDF) Program  
*Theoretical and Experimental Off-Beam Cloud Lidar Feasibility Study*,  
AD as co-I (PI: Robert F. Cahalan, NASA-GSFC)
- FY97–FY99 (≈\$260K/y): DOE Office of Science’s Atmospheric Radiation Measurement Program  
*Scale-By-Scale Statistical Analyses of ARM And Other Cloud Data in Support of 3D RT Studies*,  
AD as co-I (PI: Warren J. Wiscombe, NASA-GSFC)
- FY00–FY02 (≈\$200K/y): LANL LDRD/ER (Exploratory Research) Program  
*WAIL validation and daytime extension*, AD as co-I (PI: Steven P. Love)
- FY01–FY03 (≈\$100K/y): LANL LDRD/PRD (Postdoctoral Research & Development) Program  
*Turbulence and cloud microphysics*, AD as PI (co-I/Postdoctoral Fellow: Christopher A. Jeffery)
- FY03–FY05 (\$180K/y): DOE Office of Science’s Atmospheric Radiation Measurement Program  
*Efficient computational 3D RT for cloud models*, AD as PI (co-Is: Igor Polonsky & Michael Hall)
- FY03–FY05 (\$1.2M/y total, ≈\$150K/y for AD): LANL LDRD/DR (Directed Research) Program  
*Physics-based analyses of dynamical experiments and simulations*, AD as co-I (PI: James R. Kamm)
- FY04–FY06 (≈\$105K/y): LANL LDRD/PRD (Postdoctoral Research & Development) Program  
*Optical diagnostics of spatially variable media*, AD as PI (co-I/Postdoctoral Fellow: Igor Polonsky)
- FY05–FY07 (\$175K/y): DOE Office of Science’s Atmospheric Radiation Measurement (ARM) Program  
*Time-dependent 3D RT for WAIL & O<sub>2</sub> A-band studies*, AD as PI (co-Is: I.N. Polonsky & S.P. Love)
- FY05–FY07 (\$25K/y for LANL subcontract): NASA Radiation Sciences Program  
*Support for I3RC project and workshops*, AD as co-I (PI: Robert F. Cahalan, NASA-GSFC)
- FY05–FY07 (\$1.5M/y total, ≈\$50K/y for AD): LANL LDRD/DR (Directed Research) Program  
*Addressing the aerosol-cloud-radiation-climate puzzle*, AD as co-I (PI: Manvendra K. Dubey)
- FY07–FY09 (\$300K/y total, ≈\$75K/y for AD): LANL LDRD/ER (Exploratory Research) Program  
*Minimal Characterization of Complex Shapes*, AD as co-I (PI: Mark Mineev)
- FY07–FY09 (\$300K/y total, ≈\$70K/y for LANL subcontract): NASA – ROSES Program  
*ICESat Science Team*, AD as co-I (PI: Alexander Marshak, NASA-GSFC)
- FY09–FY11 (\$270K/y total, \$90K/y for JPL subcontract): DOE/NNSA/NA-22 – Simulation, Algorithms,  
and Mathematics (SAM) Program, *High-Efficiency/High-Fidelity Hybrid Computational Radiative  
Transfer*, AD as co-I (PI Guillaume Bal, Columbia University)
- FY11–FY14 (\$185K/y): NASA – ROSES Program (Remote Sensing Theory element)  
*Coupled Aerosol-Surface Retrieval Algorithms for Multispectral, Multiangular, and Polarimetric  
Imagery*, AD as co-I (PI: David J. Diner, JPL/Caltech)
- FY11–FY14 (\$160K/y): NASA – ROSES Program (Remote Sensing Theory element)  
*3D Tomography of the Earth’s Particulate Atmosphere*, AD as PI (co-Is Feng Xu, UCLA/JIFRESSE,  
JPL/Caltech, Guillaume Bal, Columbia University)
- FY13 (\$385K): NASA – ROSES Program (Advanced Information System Technology, QRS award)  
*Computational Technology for 21st Century Remote Sensing: Three-dimensional Tomographic  
Reconstruction of the Aerosol-Cloud Environment (3D-TRACE)*, AD as PI (co-Is: David J. Diner,  
Igor Yanovsky, Michael J. Garay, JPL/Caltech; Feng Xu, UCLA/JIFRESSE; Zheng Qu, Raytheon;  
Guillaume Bal, Columbia University).
- FY13–FY14 (\$149K/yr): JPL – R&TD Topical Project, *Breakthrough in Observation and Understanding  
of Cloud-top Turbulence*, AD as PI (co-Is: David J. Diner, G. Matheou, J. Teixeira, JPL/Caltech;  
Zheng Qu, Raytheon).

——— *Current* ———

FY10–FY15 (\$600K total): NASA – ROSES Program (Glory Science Team element)

*Untangling Aerosols and Clouds in the APS Footprint*, AD as PI (Co-Is Michael J. Garay and Zheng Qu, JPL/Raytheon; Alexander Marshak, NASA-GSFC)

CY12–FY15 (\$400K total): NASA – ROSES Program (OCO-2 Science Team element)

*Fulfilling the OCO-2 Mission in the 3D World*, AD as PI (co-Is: Zheng Qu, Raytheon; Feng Xu, JPL/Caltech)

CY12–CY13+ (\$100K total for UCLA/JIFRESSE subcontract): DOE/ARM– SBIR Program,

*Support for Development of a High-Resolution Holographic Oxygen A-band Spectrometer*, AD as Co-I (PI Fedor Dimov, Luminix)

CY15–FY17 (\$714.5K total): NASA – ROSES Program (DSCOVr Science Team element)

*EPIC Cloud Algorithms*, AD as Co-I (PI: Yuekui Yang. Co-Is: Kerry Meyer, Steven Platnick, NASA/GSFC; Qilong Min, SUNY-Albany.)

FY16–FY17 (\$455K total): NASA – ROSES Program (Remote Sensing Theory element)

*Unified Treatment of Spatial Heterogeneity and Gaseous Absorption in a Generalized Radiative Transfer Theory for Atmospheric Remote Sensing*, AD as Co-I (PI: Feng Xu. Co-I: David J. Diner, JPL/Caltech. Collaborators: Robert A. West, JPL/Caltech; William D. Collins, UC-Berkley/LBNL)